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THE

ONTARIO WATER RESOURCES

COMMISSION

WATER SUPPLY

for the

TOWN OF NEW HAMBURG

1978

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August 1969

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WATER SUPPLY FOR THE TOWN OF NEW HAMBURG

DIVISION OF SANITARY ENGINEERING

DISTRICT ENGINEERS BRANCH

PREPARED BY: G.W.SCOTT
AUGUST 1969

WATER SUPPLY - NEW HAMBURG

BACKGROUND

The Village of New Hamburg, located in Wilmot Township-Waterloo County - lies just north of Highway 7 & 8, approximately 12 miles west of Kitchener. The Nith River flows through New Hamburg then flows via a 57.9 mile meandering route to join the Grand River at Paris some 24 miles away.

The town derives its livelihood from 54 commercial establishments and 8 industries. Of the eight industries only Hahn Brass Company uses significant volumes of water in its production. (Some 5 million gallons/month).

POPULATION

Development

Official population figures reveal that over the past 10 years, growth within the community has steadily increased at a rate which fluctuates from year to year but which, when averaged, closely approximates the growth rate for the county. Population increases have generally been housed through individual home construction or partitions of existing homes. Recently Stage I of a 66 home subdivision within New Hamburg has been completed. Other projects include one of 14 triplexes and a 60 home development scheduled for the spring of 1970. In view of the extensive housing demand being generated by growth in Kitchener and Waterloo it anticipated that other developments will be undertaken in the area.

Projections

Representatives of the Waterloo County Planning Board have indicated that populations for the whole of Waterloo County are highly speculative in light of the present phenominal increases for the county to date. Population projections for New Hamburg in 1990 range around 5,000.* New Hamburg's population since 1960 have been included in the table I entitled 'Water Consumption Review' in the following section. Unfortunately, expansion in New Hamburg will be limited by the capacity of the Nith River to accept the effluent from sewage works.

In view of the range of possible populations it is virtually impossible to evaluate the ability of the present system to meet the long range demands.

WATER CONSUMPTION REVIEW - NEW HAMBURG

YEAR	TOTAL WATER CONSUMPTION	POPULATION	GAL. PER CAPITA/DAY
1960	57.780	2,063	75.0
1961	60.325	2,129	77.6
1962	59.479	2,133	76.4
1963	71.690	2,165	90.8
1964	67.080	2,215	83.0
1965	68.149	2,350	79.5
1966	86,640	2,430	97.7
1967	90,990	2,466	101.1
1968	99,635	2,353	106.9

* Waterloo County Planning Board

These figures indicate that New Hamburg's per capita consumption rate has increased by some 40% since 1960. At the present rate of increase for New Hamburg the linear projection plotted on the following page indicates that 160 million gallons of water will be needed to meet New Hamburgs' 1975 demand.

PRESENT WATER WORKS SYSTEM

(a) Source

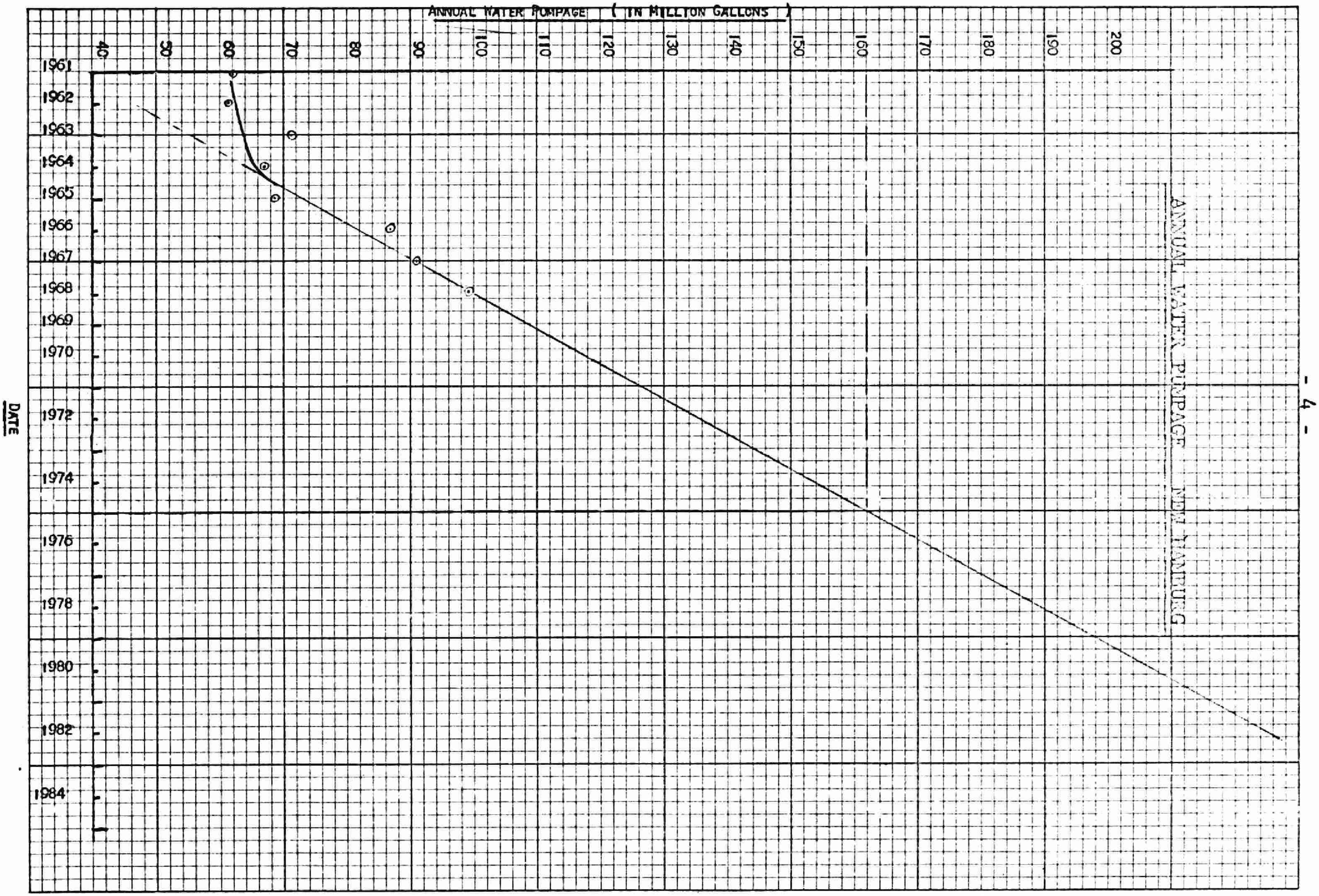
The present water supply for the Town is obtained from a well, Park Station No. 2, located in the southeast part of the village adjacent to the Nith River, and from a spring collection system located approximately 1.5 miles east and to the north of the town.

The municipal well, constructed in 1963, penetrates coarse sand and gravel beds with a 38 inch protective casing to a depth of 29 feet. The rated capacity of this well is 300 gpm.

The springs originate near the base of a moraine in the eastern section of a 70-acre area owned by the town. Approximately 50 acres of the towns' 70 acres are covered by bush while the remaining 20 acres have been reforested. The spring water, together with the surface runoff, drains into two collection ponds with a total volume of approximately 600,000 gallons.

G8-5
10 X 10 TO THE INCH
MADE IN CANADA

CC&S MICROGRAPH



(b) Water Quantity

The water works personnel maintain a complete set of records of the amount of water pumped daily from each of the two sources. From these records the following table has been prepared to permit a monthly comparison of the maximum, minimum average and total pumpages for 1967, 1968 and 1969 to date. The numbers included in brackets beside the pumpages indicate the day of the month during which these pumpages occurred.

To date in 1969 the maximum daily pumpage has been 0.535 million gallons - considerably above the 1968 maximum of 0.469 million gallons. Reportedly the present pumping system and the 120,000 gallon elevated storage tank on the distribution system have been able to supply enough water to meet the demands with no major pressure deficiencies. To meet the expected increased peak demands it will be necessary to increase the system's ability to provide the flows. The use of elevated or pumped storage has for years been utilized to equalize the peak water demands. Unfortunately elevated storage is expensive and in this location the peak demands may possibly be satisfied by introducing additional water to the system through increased pumping capacity at the existing supplies, or by providing the increased pumpage at new supplies. The economics of these alternates must be investigated.

NEW HAMBURG - WATER PUMPAGES

MONTH	MAXIMUM PUMPAGES			MINIMUM PUMPAGES			AVERAGE DAY	TOTAL
	WELL	SPRINGS	COMBINED	WELL	SPRINGS	COMBINED	PUMPAGE	PUMPAGE
1967								
Jan.	179.8 (25)	177.0 (16)	326.2 (25)	137.6 (1)	25.0 (3)	176.8	249.1	7,720
Feb.	151.0 (21)	195.0 (6)	330.2 (21)	143.0 (14)	30.0 (26)	163.9	249.3	6,981
March	151.3 (31)	174.7 (22)	322.5 (31)	140.0 (9)	30.0 (24)	174.7	258.5	8,012
April	183.9 (18)	196.7 (19)	345.3 (18)	120.0 (2)	36.0 (10)	178.0	255.4	7,663
May	150.8 (11)	219.0 (18)	360.0 (11)	2.0 (7)	18.0 (12)	160.0	251.3	7,789
June	180.0 (7)	233.9 (13)	409.9 (7)	119.0 (25)	55.0 (25)	174.0	278.9	8,366
July	189.6 (21)	400.0 (1)	400.0 (21)	53.2 (23)	79.8 (17)	79.8	226.6	7,424
Aug.	185.1 (7)	264.3 (29)	367.4 (7)	34.5 (6)	3.3 (21)	79.0	235.3	7,294
Sept.	175.8 (19)	224.5 (19)	399.8 (19)	60.3 (24)	50.0 (11)	100.0	267.9	8,038
Oct.	190.3 (2)	179.9 (28)	318.5 (2)	4.6 (7)	90.0 (23)	100.0	233.8	7,247
Nov.	187.6 (1)	193.1 (28)	366.8 (1)	116.0 (5)	20.0 (26)	143.0	248.6	7,458
Dec.	175.3 (13)	426.2 (6)	378.1 (13)	51.9 (31)	25.0 (13)	128.4	224.1	6,958
						Average	249.2	Total 90,950
								Average 7,579
1968								
Jan.	152.0 (5)	198.0 (5)	350.0 (5)	45.0 (28)	10.0 (1)	111.5 (1)	228.9	7,095
Feb.	157.1 (8)	154.0 (8)	308.0 (6)	83.2 (25)	53.4 (11)	93.1 (18)	232.5	6,744
Mar.	169.0 (29)	311.2 (19)	360.0 (28)	78.0 (10)	38.0 (23)	105.1 (31)	239.4	7,423
Apr.	166.1 (3)	475.8 (3)	475.8 (20)	80.6 (21)	80.0 (28)	105.1 (1)	222.3	6,892
May	160.0 (3)	223.2 (3)	380.3 (10)	50.5 (25)	35.1 (19)	113.7 (26)	258.9	7,767
June	210.1 (27)	268.2 (11)	391.9 (13)	49.0 (3)	23.1 (16)	130.0 (30)	262.3	7,870
July	264.0 (18)	357.6 (18)	450.7 (30)	59.3 (9)	42.0 (12)	450.7 (18)	261.4	8,123
Aug.	274.7 (30)	205.6 (15)	432.1 (31)	132.2 (18)	7.4 (13)	140.3 (1)	275.4	8,539
Sept.	238.9 (24)	259.2 (24)	469.7 (7)	120.1 (16)	26.1 (23)	157.1 (3)	320.2	9,607
Oct.	229.6 (29)	242.5 (29)	461.2 (26)	157.4 (20)	29.3 (7)	175.7 (15)	328.3	10,178
Nov.	229.5 (5)	225.3 (5)	442.8 (1)	100.7 (25)	43.2 (17)	199.0 (25)	342.5	10,276
Dec.	256.4 (30)	177.6 (25)	362.8 (25)	70.3 (28)	59.1 (24)	153.2 (26)	294.9	9,141
						Average	273.0	Total 99,655
								Average 8,304
1969								
Jan.	253.4 (1)	232.1 (30)	451.0 (28)	129.9 (2)	61.6 (1)	216.7 (2)	346.6	10,743
Feb.	221.8 (21)	232.0 (20)	453.7 (21)	131.8 (10)	39.5 (16)	242.5 (16)	348.1	9,746
Mar.	245.1 (1)	334.2 (18)	534.8 (18)	178.6 (20)	46.1 (30)	250.1 (30)	365.9	11,344

It is reported that the town will be commissioning the International Water Supply Company to study and develop the additional water supply to meet the town's future needs. The main area to be investigated has shown possible water during a resistivety survey conducted several years ago by the town's agents. Prior to any field exploration it would be advisable to consult our Division of Water Resources to review the existing ground water data available.

In order to permit an evaluation of the effect of the operation of the well on the aquifier the town forces have been obtaining weekly readings from three gauge wells in New Hamburg. A summary of the well pumpage rates and duration, as well as observations on the waterlevel in the well and the river level have been assembled on one table. This table along with a plot of the weekly depth of the three gauge wells has been appended for reference in appendix A.

In general there is a very close correlation between the river level and the depth of the gauge wells. The well levels rise as the spring runoff floods the land adjacent to the river. After the spring runoff has subsided the gauge well levels decrease as water is pumped from the municipal well. It is evident that the sand and gravel layers in the vicinity of the gauge wells are charged by the river and therefore any water must be processed as though river water were infact being used. This will be discussed under the heading (c) Water Quality.

(c) Water Quality

Bacteriological

Bacteriological samples are taken routinely by the Water Works staff and submitted to the OWRC laboratory in Toronto for examination. The results of these examinations have been assembled to produce this summary for 1968 and 1969 (end of June).

	1968		1969 (end of June)	
Sample Points	#Taken	#Adverse	#Taken	#Adverse
Well - raw	45	15	--	--
- treated	16	1	22	8
Spring - raw	43	41	--	--
- treated	40	0	22	2
Distribution System	72	16	22	0

BACTERIOLOGICAL SAMPLE RESULTS - 1968/69 - NEW HAMBURG WATER WORKS

These results re-confirm the need for continuous chlorination of the water from both the well and the springs. During 1968 it was necessary to issue an order to the consumers to boil the water before consumption because of extremely high coliform counts in the well water - probably due to contamination introduced to the shallow aquifer by the high Nith River level. This order remained in effect until the coliform counts were eliminated by flushing and disinfection. Shortly after this problem, chlorination equipment was installed at the well to provide continuous disinfection.

In 1968 the samples submitted of the water from the well and springs respectively displayed coliform bacteria at levels up to 26,000 and 7,900 bacteria/100 ml. of sample. In view of these high coliform counts it is necessary to ensure that adequate disinfection is carried out at all times. With coliform levels averaging in excess of 100 coliform/100 ml. of sample the ability of chlorination to provide a complete bacterial kill is questionable. As shown on the following graph, the coliform levels in the raw water at the spring supply frequently exceed this desired level. It would appear from usually satisfactory treated water samples that chlorination has been effective in killing the raw water bacteria. However, in view of the larger volumes of water being taken from the springs and the problems of disinfection associated with the organic colouring experienced occasionally at this source, it is recommended that the spring supply be phased out as a water source.

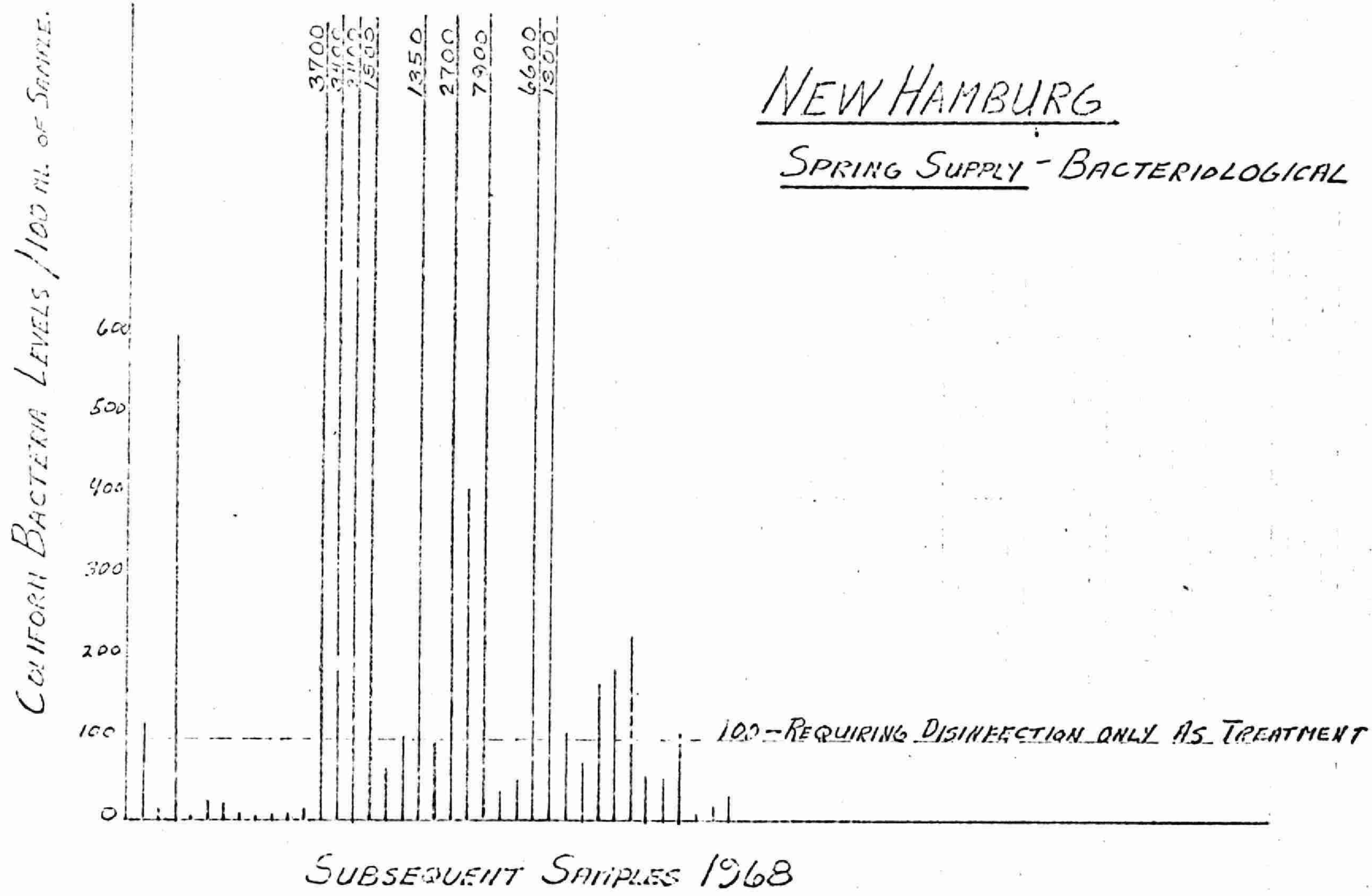
In the interim it is strongly recommended that a chlorine residual of 0.5 ppm be maintained at all times at both sources and that the following minimum bacteriological sampling programme be followed.

SAMPLE POINT		#SAMPLES/MONTH	SAMPLING FREQUENCY
Spring	-Raw Water	4	once a week
	-Treated Water	4	once a week
Infiltration Well	-Raw Water	4	once a week
	-Treated Water	4	once a week
Distribution System		13	Some each week

RECOMMENDED BACTERIOLOGICAL SAMPLING PROGRAMME - NEW HAMBURG

NEW HAMBURG

SPRING SUPPLY - BACTERIOLOGICAL



Chemical

In general the water from the spring was hard, and contained satisfactory low chloride and iron levels. The water from the well is very hard but otherwise satisfactory on the basis of the analyses requested previously.

The results of the chemical analyses preformed on the samples submitted in 1968 and 1969 to date have been assembled, averaged and are presented below.

Sample pt.	Hardness as $CaCO_3$ ppm	Alkalinity as $CaCO_3$ ppm	Iron as Fe ppm	Chloride as Cl ppm	pH
Spring	264	233	0.16	5	8
Well	305	303	0.13	27	7.5

A copy of the sample results from the field inspection of June 3,1969 has been appended for comparison. The sulphate level of the well water on June 3, (128 ppm) was within the level of 250 ppm established as on upper limit by this Commission.

Since the well is essentially an infiltration well and since the Nith River may occasionally receive some pollutional loading upstream of the New Hamburg Well in the form of industrial and agricultural wastes, the water quality must be continuously monitored for as long as the well is used to determine the level of contamination. Samples should be analized routinely for:-

BOD - Cyanide - Copper - Nitrogen.

(d) Future Sources

(1) Nith River

Flow records available from the federal streamflow gauging station 26A - 18 in the Town of New Hamburg indicate that the mean annual discharge since 1950 is 185 cfs. However the river is unsuitable as a water supply since a minimum flow of 0 cfs. has been recorded for the Summer-Fall season during the recorded history of the gauge. A summary of streamflow data for the Nith River at New Hamburg has been included in this report as appendix B.

Data compiled by the Water Qualities Branch of the Division of Sanitary Engineering* indicates that the nutrient levels of the Nith River are already well in excess of those considered to cause excessive algal growth.

(2) Baden

The Police Village of Baden (population 250) is presently developing a water works to supply the community with well water. The water will be supplied from a new 150' drilled well. The capacity of the present well is being limited by the screening used since only a relatively small amount of water will be needed at present. It is estimated from test pumping that this well could be developed to provide water at up to 1,000 gpm. In general the water is hard (225 ppm Hardness as Ca CO_3) although considerably softer than the wells in a nearby aquifer and softer than New Hamburg's shallow well. This well water does contain iron (1.5 ppm) in concentrations exceeding this Commission's objective of 0.3 and therefore may present some problems of colour and staining. This water can be treated effectively to eliminate these problems.

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* #2 WATER USE EXAMINATION OF THE LOWER NITH RIVER
March 1969
Water Quality Surveys Branch
Division of Sanitary Engineering

It was reported that New Hamburg has been following the development of the Baden water works system in order to evaluate the possibility of interconnecting the two systems. This interconnection would permit the district High School to be served by the Baden system as well as provide New Hamburg with additional water and Baden with back up pressures in the event of pump failure etc.

For the Police Village of Baden, the development of a Provincial water works and distribution system is a very expensive proposition. By supplying some of the available water to New Hamburg the per capita cost to the present and future Baden residents could be substancially reduced. New Hamburg would profit from any aquisition of water from the Baden well by the fact that an adequate supply of consistently satisfactory water would be supplied for may years into the future. New Hamburg could make arrangements to obtain water from the Baden well to meet its future needs. If Baden finds it is unable to finance the construction of the distribution system then New Hamburg might still approach the Commission to arrange to utilise this existing well. The construction of a main to supply New Hamburg from this well could probably be done at a lower cost than that involved in developing a new well within the town boundries.

(3) Municipal Park - Woolwich St. & Bleams Road West

Early Commission records indicate that there are some springs in the municipal park on Woolwich Street which have been measured as providing flows of 400 gallons/minute. Bacteriological samples indicated the presence of coliform bacteria. The water was hard (475 ppm) and had high levels of nitrites. No recent information is available on the water quality or flows of this source.

Early reports also mention a 900 gpm spring on Bleams Road West, but no information on water quality is available. A copy of the map which accompanied the Ground Water Survey report prepared by Mr. R.C. Hore in our Water Resources Branch August 1960 has been affixed to this report. The map delineates the areas recommended for test drilling as a result of the 1960 survey. These sources should be examined again for significant data on the natural underground water available in New Hamburg, which may aid the development of any new sources within the town. The hydrological data available through the Water Resources Branch should be examined as an important additional source of data in any evaluation.

SUMMARY

The present water sources consistently display bacteriological contamination. Continuous chlorination is necessary to ensure that bacteriologically satisfactory water is supplied to the consumer. Coliform levels in the spring supply are frequently above the level for which chlorination only is suitable treatment. The spring supply should therefore be abandoned.

The well in service is essentially an infiltration well fed by the Nith River. As this river is to receive the effluent from a new sewage treatment works in Wellesley over and above any industrial and agricultural wastes which may occasionally reach the river, the well water must be monitored for BOD, cyanide, copper and nitrogen levels. This data will permit an evaluation of the level of pollution in the drinking water. The well is of doubtful bacteriological quality and is susceptible to pollution from the waters of the Nith River and therefore should be removed from service when possible.

New Hamburg is sharing in the extensive population increases being experienced in the Kitchener-Waterloo area. At present, construction of 126 single family dwellings and 14 triplexes is progressing. Increased quantities of water can not be supplied from the existing facilities to meet the demands of the near future.

It will be necessary to increase the system's capacity to meet peak demands by either increasing the existing pump capacities, or by introducing new sources and feed pump, or through the construction of storage facilities. The town is preparing to engage a water consultant to locate and develop an additional water supply to meet future needs.

Possible sources of additional water for New Hamburg include several natural spring areas within the town, the newly developed Baden deep well and two locations where tests indicate a drilled well should be successful. It is recommended that the Baden well be utilized to obtain an adequate supply of water with a consistently satisfactory bacteriological and chemical quality.

RECOMMENDATIONS

In the preparation of this report recommendations were made on two levels. These recommendations are grouped below:

Immediate

(1) A chlorine residual of 0.3 ppm be carried at both the well and spring *at all times*.

(2) The bacteriological sampling programme be expanded to meet this Commission's sample requirements.

(3) An expanded chemical analyses of the well water must be requested to determine the level of BOD, cyanide, copper and nitrogens in the well water.

Long Term

(1) The spring supply should be abandoned.

(2) The existing well supply should be phased out.

(3) The Baden well should be utilized for New Hamburg's supply if possible.

Prepared by......Wayne Scott......
G. W. Scott, Engineer,
Division of Sanitary Engineering.

GWS:pr

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

WATER ANALYSIS

All analyses except pH reported in p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: New Hamburg

Report to:

c.c.

Source: Municipal Supply

Date Sampled: June 3,1969 by: G.W.Scott

Lab. No.	Hardness as $CaCO_3$	Alkalinity as $CaCO_3$	Iron as Fe	Chloride as Cl	pH at Lab.	Fluoride as F	Apparent Colour Units	Turbidity Units	Sulphate as SO_4
W 3972	459	311	0.10	28	7.6				128
W 3973	252	245	0.10	6	7.8				--

BACTERIOLOGICAL SAMPLE RESULTS*

Sample Point Description	Sample#	Total Coliform	F.Co
(1) Springs			
raw water	3209	80 +	38
treated water	3217	0	0
(2) Well			
raw water	3208	0	0
treated water	3216	0	0
(3) Distribution System			
works barn	3210	0	0
Speed wash	3211	0	0
Hoffner Motors	3212	0	0
garage	3213	0	0

W 3972 W - 9 Well #1 Raw Water

W 3973 W - 10 Springs Treated Water

* Bacteriological examinations were conducted at the Public Health Laboratory-Woodstock.

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APPENDIX "A"

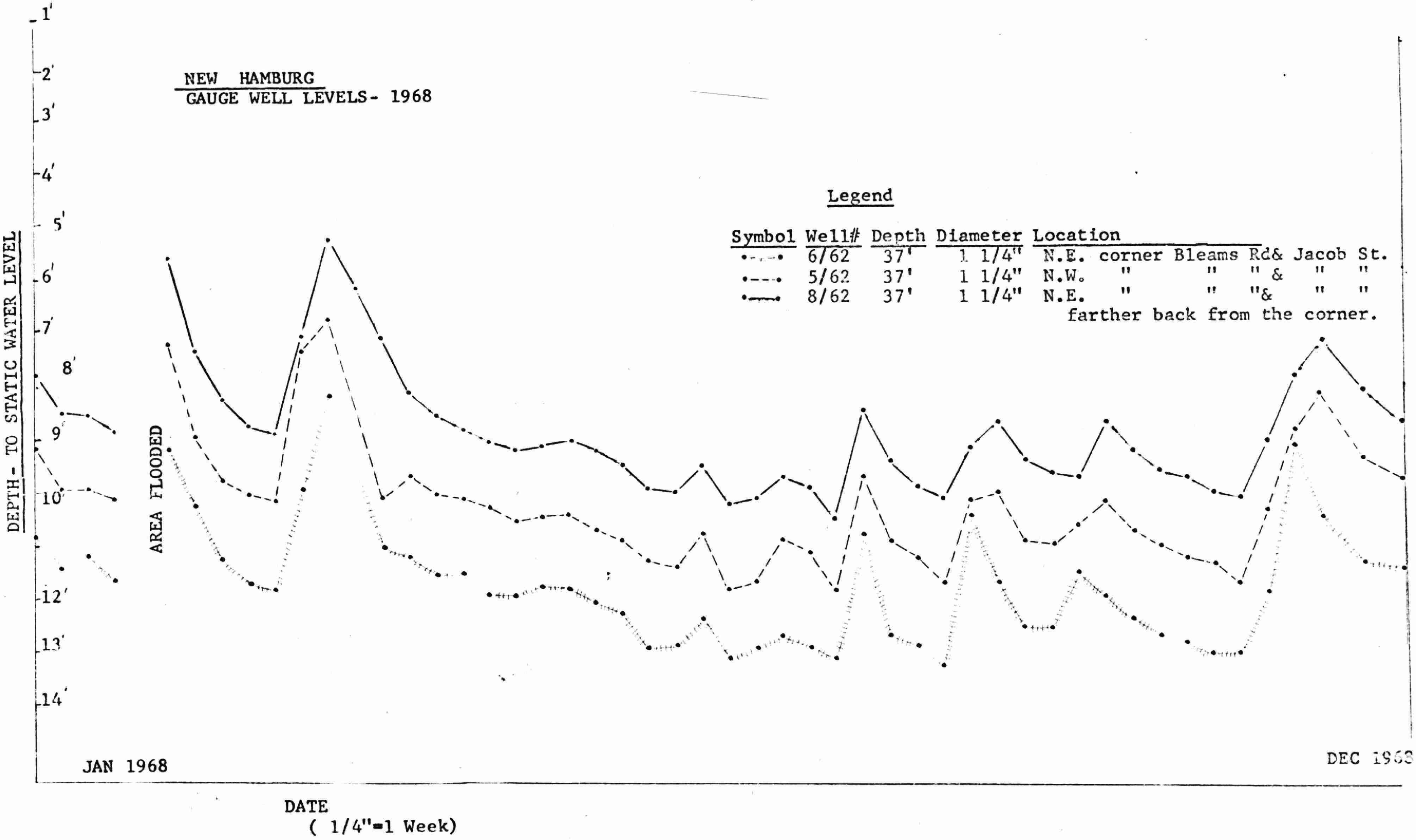
APPENDIX "A"

NEW HAMBURG GAUGE WELLS

1968

MONTH	TOTAL PUMPED	PUMP RATE/TIME/DURATION	COMMENTS ON WATER LEVEL & OBSERVATIONS ON WELL
Jan.	3,801,200	140/17/24, 100/17/7	Slightly above normal.
Feb.	3,691,500	150/17/21, 100/17/6	Above normal - heavy rain.
Mar.	3,559,100	150/17/20, 100/17/4, 55/17/2	Considerable rise - spring runoff - well contamination.
Apr.	2,378,000	150/17/11, 100/17/3, 80/17/2(To Waste 200/24/12)	Water to waste Apr. 1-12 - level about normal.
May	4,273,100	150/17/23, 100/12/8	Slightly above normal - normal precipitation.
June	4,021,900	200/17/4, 170/17/9, 160/17/2, 150/17/9, 50/17/2	Normal - well contamination.
July	3,929,900	200/17/13, 175/17/3, 150/17/5	Normal (considering heavier pumping) Chlorinator.
Aug.	6,109,500	200/17/17, 145/17/14	Normal - heavy rain - no bacteria.
Sept.	6,077,800	200/17/20, 140/17/8,100/17/2	Normal.
Oct.	6,284,900	200/17/22, 140/17/9	Normal but slowly dropping.
Nov.	6,111,700	200/17/26, 140/17/4	Below normal - restored by heavy rain.
Dec.	5,816,500	200/17/18, 140/17/4, 120/17/9	Normal after late November rain.

NEW HAMBURG
GAUGE WELL LEVELS- 1968



Legend

Symbol	Well#	Depth	Diameter	Location
•-.-•	6/62	37'	1 1/4"	N.E. corner Bleams Rd& Jacob St.
•---•	5/62	37'	1 1/4"	N.W. " " " & " "
•——•	8/62	37'	1 1/4"	N.E. " " "& " " farther back from the corner.

APPENDIX "B"

APPENDIX B

SUMMARY OF STREAMFLOW DATA
NITH RIVER AT NEW HAMBURG

Description

The selected site is at the federal streamflow gauging station 2GA-18 in the Town of New Hamburg, above the control dam about 300 feet upstream of the bridge on the main road through New Hamburg. Drainage area: 209 square miles.

Data Available

Records are available from the federal streamflow gauging station 2GA-18 for the period May 1950 to the present; discharges have been obtained since August 1965 at the relocated station about 300 feet upstream from the former manual station. The analysis is based upon the period 1950 - 1966.

Remarks

Records are good during open-water periods and fair during ice periods.

I Mean Annual Discharge in cfs

The mean annual discharge over the 15-year period 1950 - 1965 is 185 cfs.

II Mean Monthly Discharges in cfs

Tabulated below are the estimated mean monthly discharges that will probably be equalled or exceeded 80, 90 and 95 per cent of the time.

Month	80%	90%	95%
January	32	17	12
February	43	26	17
March	340	270	220
April	225	160	120
May	49	32	22
June	21	17	13
July	13	11	10
August	12	11	10
September	11	9	8
October	17	15	12
November	28	20	17
December	33	23	5

cont'd....

III Minimum Consecutive Day Discharge in cfs

a. Recorded discharge

Days	Winter Season Discharge Maximum	Median	Minimum	Summer-Fall Season Discharge Maximum	Median	Minimum
1	48	19	7	29	5.9	0
7	61	20	7	34.6	7.6	3.4
15	115	26	8	39.7	10.0	5.6
30	141	36	10	44	11.5	6.0
month	182	45	12.2	44	13.9	8.6

b. Magnitude and frequency of summer-fall low flows

Days	Discharge in cfs for indicated recurrence interval in years Most Probable	5	10	20
1	7.5	2.7	1.6	1.0
7	8.8	4.8	3.6	2.8
15	12	6.8	5.2	4.0
30	14	8.5	6.7	5.4

PLAN OF THE NEW HAMBURG AREA

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